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| EXAMINER |
|---|
| NGUYEN, LEON VIET Q |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on *31 March 2009*.
2a) ☒ This action is **FINAL**.            2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) *1 and 24-27* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) *1 and 24-27* is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on *26 February 2004* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All   b) ☐ Some * c) ☐ None of:
        1. ☐ Certified copies of the priority documents have been received.
        2. ☐ Certified copies of the priority documents have been received in Application No. _____.
        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *3/31/09*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1.     This office action is in response to communication filed on 3/31/09. Claims 24-27

have been added. Claims 1 and 24-27 are pending on this application.


### *Response to Arguments*

2.     Applicant's arguments with respect to claim 1 has been considered but are moot

in view of the new ground(s) of rejection.


### *Information Disclosure Statement*

3.     The information disclosure statement (IDS) submitted on 3/31/09 was filed after

the mailing date of 3/31/09. The submission is in compliance with the provisions of 37

CFR 1.97. Accordingly, the information disclosure statement is being considered by the

examiner.


### *Claim Rejections - 35 USC § 103*

4.     The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.     **Claim 1 rejected under 35 U.S.C. 103(a) as being unpatentable over Boariu**

**et al (US6865237) in view of El-Gamel et al (US7010053).**

Re claim 1, Boariu teaches receiving content for transmission (receiver 302 in fig. 3) from a plurality of three or more transmit antennae (antennas 314, 316, and 318 in fig. 3); and

generating a rate-one (col. 12 lines 51-53), space-frequency code matrix (col. 12 lines 38-50) from the received content for transmission via the plurality of three or more transmit antennae (antennas 314, 316, and 318 in fig. 3).

Boariu fails to teach a method wherein the plurality of three or more transmit antennae transmit to a plurality of receive antennae and provide full space-frequency diversity of M*N*L , where M is a number of transmit antenna, N is a number of receiver antenna, L is order of frequency selective channel.  However El-Gamel teaches a plurality of receive antennae (col. 3 lines 37-42) and providing full space-frequency diversity of M*N*L (col. 3 lines 35-37, col. 13 line 61 – col. 14 line 20 , Table 3), where M is number of transmit antenna ($L_t$ in table 3), N is number of receiver antenna (col. 14 lines 56-59, $L_{ISI}$ in Table 3.  Each path corresponds to an antenna), L is a number of matrix channel taps (col. 13 lines 61-63, k).

Therefore taking the combined teachings of Boariu and El-Gamel as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of El-Gamel into the method of Boariu.  The motivation to combine El-Gamel and Boariu would be to advantageously maximize spatial and temporal diversity (col. 3 lines 41-42 of El-Gamel).

**6.     Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boariu et al (US6865237) and El-Gamel et al (US701053) in view of Lee et al. ("A Space-Frequency Transmitter Diversity Technique for OFDM systems", Globecomm 2000, IEEE Global Telecommunications Conference; November 27, 2000).**

Re claim 24, the modified invention of Boariu fails to teach a method wherein the received content is a vector of input symbols of size $Nc$ x 1, wherein $Nc$ is the number of subcarriers of the multicarrier wireless communication channel.

However Lee teaches wherein a received content is a vector of input symbols of size $Nc$ x 1 (*pg. 1474,* right column, first paragraph), wherein $Nc$ is the number of subcarriers of the multicarrier wireless communication channel (equation (1), $Xo(n)$-$Xl^*(n)$... '$Xn$-2$(n)$-$Xn$-$l^*(n)$ and $Xl(n)$...$Xn$-2"$(n)$ are interpreted to be corresponding to the number of subcarriers).

Therefore taking the combined teachings of Boariu and El-Gamel with Lee as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Lee into the method of Boariu and El-Gamel.  The motivation to combine Lee, El-Gamel and Boariu would be to provide higher gain than conventional OFDM systems (page 1475 right side first paragraph of Lee).

**7.      Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable**

**over Boariu et al (US6865237), El-Gamel et al (US701053) and Lee et al. ("A Space-**

**Frequency Transmitter Diversity Technique for OFDM systems", Globecomm**

**2000, IEEE Global Telecommunications Conference; November 27, 2000) in view**

**of Giannakis et al. (US7224744).**

Re claim 25, the modified invention of Boariu fails to teach a method wherein

generating a rate-one space frequency code matrix comprises:

dividing the vector of input symbols into a number G of groups to generate

subgroups; and

multiplying at least a subset of the subgroups by a constellation rotation precoder

to produce a number G of pre-coded vectors (Vg).


However Giannakis teaches dividing the vector of input symbols into a number G

of groups to generate subgroups (col.9, lines 1-15; col. 10, lines 15-23); and

multiplying at least a subset of the subgroups by a constellation rotation precoder

to produce a number G of pre-coded vectors (col.9, lines 1-15; col. 10, lines 15-23)


Therefore taking the combined teachings of Boariu, El-Gamel and Lee with

Giannakis as a whole, it would have been obvious to one of ordinary skill in the art at

the time the invention was made to incorporate the step of Giannakis into the method of

Boariu, Lee and El-Gamel.  The motivation to combine Giannakis, Lee, El-Gamel and

Boariu would be to achieve maximum space path diversity order(col. 10 lines 45-53 of

Giannakis)

Re claim 26, the modified invention of Boariu teaches a method further

comprising:

dividing each of the pre-coded vectors into a number of LM x 1 subvectors, and

to create an M x M diagonal matrix = Dsg,k = diag{$\Theta TM \times (k-1)+1Sg$ ,..., $\Theta TMxkSg$ },

where k=1...L from the subvectors (col. 9, lines 45-60 and col. 10, lines 15-23 of

Giannakis).

Re claim 27, the modified invention of Boariu teaches a method further

comprising:

interleaving the L submatrices from the G groups to generate an M x Nc space-

frequency matrix (col. 9, lines 32-55 of Giannakis).

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### Conclusion

8.      Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

/Kevin M. Burd/
Primary Examiner, Art Unit 2611